Simple steps to reduce lawn fertilizer use

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Fertilizers are a source of Chloride to our waters

Figure 13: Fraction of annual chloride contributions from major point and nonpoint sources for State of Minnesota (Overbo et al. 2019)
How much turf fertilizer is used?

• In Minnesota:
• 62,000 tons/yr non-ag uses
  – Lawns
  – Golf courses
  – Sports fields
  – Ornamentals
  – Gardens

MDA, 2017 data
What about developed areas?

- It’s a small source of chloride statewide
- Twin cities or larger cities, would be much larger part of fertilizer input
How much chloride in 62,000 tons?

- Rough estimate- 90-95% are KCl based
  - 56-59,000 tons/yr
  - How much is chloride?
  - Roughly 5% of a 20-0-10 bag is Cl

- Roughly 3,000 tons/yr Cl
Seems relatively small, but....

• Can pollute ~40 billion gallons of water/yr
Where is the chloride in fertilizer?

Potassium

K
Most common source of K for turf fertilizers = Muriate of Potash (KCl)

Soluble Potash (K₂O) ........ 8%

Derived From: Ammonium Sulfate, Urea, Polymer Coated Sulfur Coated urea, Muriate of Potash, Sodium Borate...
It’s a bit tricky to figure out if you have Cl in your fertilizer

• KCl
• Potassium chloride
• Potash
• Muriate of potash
• MOP

Not sure? Roughly 90-95% of lawn fertilizers contain KCl
Now that we know turfgrass fertilizers are a Chloride source, what can we do?

• Base management practices on turfgrass physiology
Use alternate sources of Potassium

- Sulfate of potash (SOP) $\text{K}_2\text{SO}_4$
- Sulfate of potash-magnesia (Sul-Po-Mag)
- Better source of K
- $$
Conduct a soil test/Buy correct fertilizer

- Only apply amount of K needed!
- In this case, 0

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**SOIL TEST REPORT**

**Lawn and Garden**

**Sample/Field Number:** DMC0

**Estimated Soil Texture:** Medium

<table>
<thead>
<tr>
<th>Organic Matter</th>
<th>Noon</th>
<th>Soluble Salts</th>
<th>Buffer Index</th>
<th>Nitrate N</th>
<th>Chloride</th>
<th>Phosphorus</th>
<th>Potassium</th>
<th>Sulfur</th>
<th>Zinc</th>
<th>Iron</th>
<th>Manganese</th>
<th>Copper</th>
<th>Boron</th>
<th>Calcium</th>
<th>Magnesium</th>
<th>Less than ppm</th>
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<tbody>
<tr>
<td>4.0</td>
<td>7.6</td>
<td>5</td>
<td>6</td>
<td>8</td>
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<td>0.5</td>
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<td>0.5</td>
</tr>
</tbody>
</table>

**INTERPRETATION OF SOIL TEST RESULTS**

- **Phosphorus (P):** Low (5), Medium (10), High (15), Very High (20)
- **Potassium (K):** Low (25), Medium (75), High (125), Very High (175), Excellent (225)

**RECOMMENDATIONS**

- **LIME RECOMMENDATION:** 0 LBS/1,000 SQ.FT.
- **TOTAL AMOUNT OF EACH NUTRIENT TO APPLY PER YEAR:**
  - NITROGEN: 0.5 LBS/1,000 SQ.FT., 25 LBS/acre
  - PHOSPHATE: 1 LBS/1,000 SQ.FT., 45 LBS/acre
  - POTASH: 0 LBS/1,000 SQ.FT., 0 LBS/acre

**Use a fertilizer with the percentage of nutrients closest to the above ratios.** Apply according to the instructions on the fertilizer bag or container, or determine the amount required from the instructions given on the back side of this report. Since the exact amount required is often not possible in most cases, it is more important to apply the amount of nitrogen required and compromise some for phosphate and potash.

- Apply the total amount recommended above at one time in early September.

*CAUTION! Do not apply more than 1 lb. nitrogen per 1000 sq. ft. in one application to avoid burning the grass, unless a slow release form or organic fertilizer is used. It is recommended that up to 50 percent of the nitrogen be of the slow release form.*
This site needs 1 lb K/1000 ft$^2$ per year.
When to fertilize in MN

2ND BEST TIME - ~ Mother’s Day

BEST TIME - ~ Labor day

Cool season grasses

Shoot growth

Root growth

Temperature

Apr

May

Jun

Jul

Aug

Sept

Oct

Nov
Divide total amount by # applications

Example:

1/3 lb K/1000 ft²  
Spring
2/3 lb K/1000 ft²  
Fall

<table>
<thead>
<tr>
<th>Phosphorus (P)</th>
<th>Potassium (K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>25</td>
</tr>
<tr>
<td>Medium</td>
<td>75</td>
</tr>
<tr>
<td>High</td>
<td>125</td>
</tr>
<tr>
<td>Very High</td>
<td>175</td>
</tr>
</tbody>
</table>

**LIME RECOMMENDATION:** 0 lbs/1,000 sq. ft.

**TOTAL AMOUNT OF EACH NUTRIENT TO APPLY PER YEAR:**

- **NITROGEN:** 2 lbs/1,000 sq. ft.
- **PHOSPHATE:** 0 lbs/1,000 sq. ft.
- **POTASH:** 1 lbs/1,000 sq. ft.

**THE APPROXIMATE RATIO OR PROPORTION OF THESE NUTRIENTS IS:** 20-0-10

Use a fertilizer with the percentage of nutrients closest to the above ratio. Apply according to the instructions on the fertilizer bag or container, or determine the amount required from the instructions given on the back of this report. Since meeting the exact amount required for each nutrient will not be possible in most cases, it is more important to apply the amount of nitrogen required and compromise some for phosphate and potash.

**CAUTION:** Do not apply more than 1 lb. nitrogen per 1000 sq. ft. in one application to avoid burning the grass, unless a slow release form or organic fertilizer is used. It is recommended that up to 50 percent of the nitrogen be of the slow release form.

- Apply 1/2 of the above total late spring.
- Apply the other 1/2 of the above total late summer.

Grass clippings left on the lawn is a sound practice. They recycle nutrients and conserve moisture. The above recommendations reflect this contribution.

Country: HENNEPIN  
Additional information on the website: http://soiltest.umn.edu/
No soil test?

• Potassium- use ½ amount of N
• Or...maybe no K since we know Cl is a problem
• May not be right, but better than guess
Not too late or too early

Uptake of nutrients is limited at soil temps < 50°
Don’t rely on bag for recommendations?
These are not specific to your site.

How to Use *

For optimum performance, begin spring applications just before soil temperatures reach 50 degrees F. Although nitrogen can be applied at the rate of 1.0 lb per 1,000 sq. ft. every 8 weeks, it is also recommended that lighter, half-rate applications be made each month, especially during hot, dry periods. Continue scheduled feedings throughout the growing season until soil temperature retreats to below 50 degrees F. Late fall and dormant feedings are recommended after soil temperatures remain below 50 degrees F for several consecutive days and turf growth has slowed considerably.

Apply product evenly with a calibrated spreader. For best results, apply before rainfall or irrigate immediately after application.
Calibrate equipment

If we know how much is delivered we can put down the right amount

Calibration can protect our waters!
Mow high

As mowing height decreases

Depth of rooting decreases and maintenance increases

= healthier turf
Better able to mine nutrients and water from soil
Leave the clippings

- will reduce the amount of K to add
Determine site expectations

Does every site need to look like this?

Fertilizer use increases with expectations
Clean up
Ideas for reducing Chloride loading from turf fertilizer

• Only apply K if needed based on soil test???
  Similar to MN phosphorus restriction
• Others?
Conclusions

• We have a lot to learn about Cl from turf fertilizers

• It’s a small percentage of the total chloride load

• But, we shouldn’t ignore it

• If this is part of your work, you can do something
Turfgrass Maintenance
with reduced environmental Impacts
https://www.pca.state.mn.us/water/summer-turf-grass-maintenance-training

Free live-streamed classes available:
8/11
8/13

Voluntary Environmental Certification Level 1
Turfgrass Maintenance Best Practices

This is to certify that

Lauren Tjaden
Fortin Consulting Inc.

has passed the certification examination and has volunteered to apply summer maintenance best management practices.

Your knowledge and actions will help protect Minnesota lakes and streams.

Andrew Ronchak
Resource Management and Assistance Division
Issue Date: March 26, 2014

Certificate Expires 5 years after Issue Date

Minnesota Pollution Control Agency
Questions?

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